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Chauncey Starr*

The management of unintended technological side-effects in our social structure has historically been based on trial and error. As the defects of our existing and expanding technological systems have been revealed over time, we have created specific agencies to protect the public from specific risks. As a current example of response to specific hazards, we have the Environmental Protection Agency's concerns with toxic substances and air pollution, and the Food and Drug Administration's concern with chemical additives. As a unique exception to this trial and error history, public fear of hypothetical effects has resulted in an anticipatory approach by the Nuclear Regulatory Commission to risk management for nuclear power.

Regardless of the origin of our regulatory agencies, our national management of technological hazards is disaggregated, and lacks overall consistency in the criteria and treatment of public health and welfare. This fragmentation has nurtured the growth of several independent but related professional groups: risk assessors concerned with human health; environmental impact assessors concerned with the ecology; and technology assessors concerned with society's future. Presumably, these assessments—heavily focused on the disbenefits, as evidenced by the words "risk" and "impact"—are intended to provide a basis for political decision-making on how society should regulate the technologies.

In each agency, decisions have generally been arrived at through case-by-case considerations of the available information, submitted opinions, and personal judgments. In such circumstances it has been inevitable that the limited quantitative analysis used has been heavily weighted with personal and special interests, perceptions of current public opinion, and agency political interests. We do not have a consistent national policy on values and criteria to guide regulatory agencies concerned with technologies that influence public health and welfare. The result is a confusion of regulatory agency positions

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on such criteria as "the value of human life," "cost/benefit ratios," "negligible risk," "unacceptable risk," "public interest," "national interest," etc.

It is not generally appreciated that in considering any technology, the complexity of the benefits associated with it may be as great as the complexity of the risks, and, of course, it is not sufficient to discuss the risks of a technology without discussing with equal emphasis its benefits. These benefits include those that are quantifiable and those that are much more intangible but equally important. It is only when one makes a detailed comparison of all alternatives that the full spectrum of risks and benefits is disclosed. We currently have no framework for doing this.

To be useful, alternatives should be compared on common criteria for both benefits and risks. Independent agency goals for each option confuse, rather than help, the decision-making, because of the lack of a common approach among the agencies. For example, the Nuclear Regulatory Commission focuses generally on postulated rare events involving nuclear plants which have the potential to endanger a regional population, without considering the risks of the coal alternative. The Environmental Protection Agency has primarily used the continuous effluent of hazardous pollution from fossil fuel plants to set their design goals, although we know that coal storage piles, oil tank farms, and gas delivery systems all have accidental fires or releases in which the effluents are not controlled and which have potential respiratory or carcinogenic consequences to regional populations. Rare accidents with fossil fuels have a historical frequency which may make their public health consequences greater than those from postulated nuclear accidents. EPA, of course, does not consider the risks of the nuclear alternative. Neither agency considers the feasible mix of energy alternatives, the political consequences of imported fuels, or such macroeconomic issues as employment, productivity, and income. The overall public welfare is not the responsibility of any of these narrowly specified regulatory agencies.

To achieve such a consistent assessment of societal alternatives with regard to risk, social costs, and social benefits, we must develop a fresh approach which takes a broader view which includes all the principal determinants of public welfare.

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Difficult as this task may be, I believe that a major improvement over our present approaches can be achieved by consolidating in one agency the national responsibility for assessing the effects of technologies. In addition to providing professional consistency, such a single agency would be able to evaluate the consequences of proposed actions on the distributions of risks among alternatives, as well as the effect on social costs and benefits. Such an overall fact-finding and assessment, incomplete as it may be, would indeed provide the regulatory agencies and political decision-makers with as good a basis as current knowledge permits.

An alternative to a single analytic assessment agency would be for each regulatory agency to follow the same written body of quantitative criteria, analytic methodologies, and professional rules for assessment. The state of the art is not sufficiently developed to permit formalizing such a comprehensive set of ground rules. For decades to come, these rules will be learned by doing. In addition, each agency would be required to consider the full spectrum of its decision consequences on the overall public welfare. For example, the NRC would be required to consider the broad consequences of nuclear power regulations, not only with regard to nuclear risk, but also with regard to air pollution, oil imports, economic growth, and other indirect effects. However, it would be impractical and redundant, although not impossible, for every regulatory agency to acquire such a professional capacity. It appears to me simpler to centralize this function, and to separate it from the political processes of regulation and implementation.

While I am convinced that analytical studies of the risks, social costs, and social benefits of alternative technologies can be conducted sufficiently well to make a substantial contribution to the decision-making, I do not believe that these analyses by themselves are sufficient. There should be a separate process, political in nature, by which the complicated mix of our social values and equities—tangible and intangible—are balanced to establish a national policy for the evaluation of risks, costs, and benefits. We have no such policy today. Our regulatory agencies will undoubtedly continue to provide the political forum for elucidation of such issues.

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